



Service Description Carrier Ethernet P2P.

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1. Drei – high performance, flexible and cost efficient.

Drei is the strong and flexible telecommunications. Hence, Drei is the primary alternative provider for communications services to corporate clients, we understand our role as that of Full Service Provider with comprehensive expertise for fixed network, Internet and data networks. We are setting standards in each of these areas of technology – consistent with our mission: high-performance – flexible – cost-efficient.

With high-value products and innovative telecommunications solutions, we support our customers in securing their competitive advantage in a networked, dynamic business environment. In Austria, Drei combines its know-how and the security of being an international successful group, with local strengths; these include having its internal sales force, active throughout Austria, and its own high-performance infrastructure.

2. Carrier EthernetP2P Service.

2.1 General.

The Service **EthernetP2P** offers fixed connections between customer sites, based on Ethernet technology with symmetrical bandwidths from 1 Mbps up to 10 Gbps. In the local loop, the locations can be linked to the Ethernet backbone via copper or optical fiber infrastructure. In case using the Drei Ethernet backbone is not appropriate, EthernetP2P may also be established via direct Leased Line connection.

Within the scope of the existing technical and operational capabilities, Drei provides the customer at the customer's requested site with a connection to the EthernetP2P service. The site of a connection is denoted by giving the exact address and the location in the building designated for the task. EthernetP2P connections are set up between the terminals by Drei, in accordance with the details provided by the customer.

2.2 Standard topologies.

Apart from fixed point-to-point connections between two points only, point-to-multipoint connections can also be set up between a central unit and an external facility using Ethernet P2P. In this process, high numbers of point-to-multipoint type EthernetP2P connections can be aggregated in a central location forming classic star-topologies. A central location linked up in this way can also have a backup line at its disposal (double star-topology).

P2P Connection

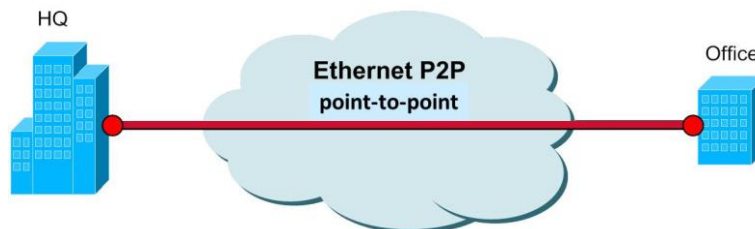


Figure 1: P2P Connection

Star Topology

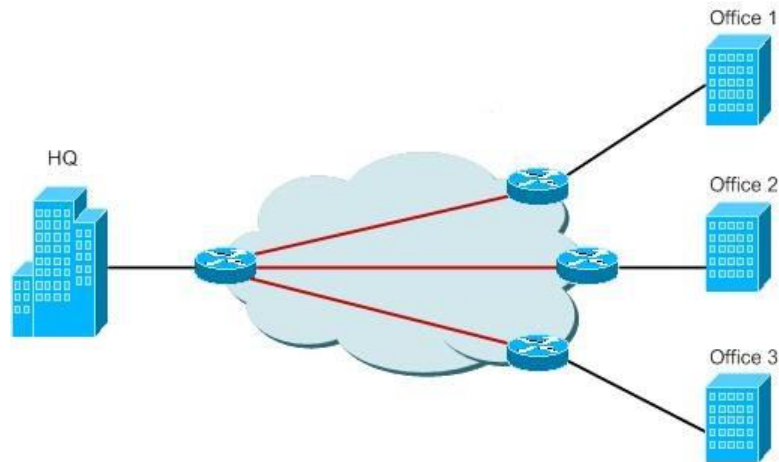


Figure 2: Star Topology

Double Star Topology

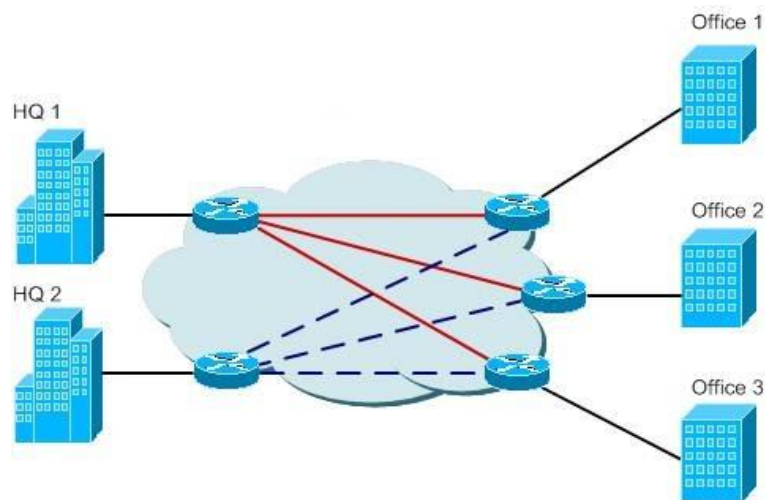


Figure 3: Double Star Topology

2.3 Special design topologies.

On request, EthernetP2P can be provided in an MP2MP (VPLS) configuration. In this case, the relevant parameters have to be explicitly agreed between Drei Solution Design and the Carrier customer.

Carrier EthernetP2P may also be combined with an optional Drei router, functioning as an additional CPE (Customer Premises Equipment). With this special design topology, the router provided by Drei is always delivered with “Shared Router Service”. Drei supplies the complete solution for the EthernetP2P network, ranging from the Carrier EthernetP2P service to any optional CPE required. The CPE, i.e. the router, has to be purchased and passes over into the property of the customer.

The service responsibility of Drei applies to the complete solution; however, the optional routers are not integrated into the Drei central management system. The service responsibility of Drei terminates at the interface of the line unit to the terminal equipment. Should it, in any case, be necessary to replace the optional Drei router, the carrier customer may provide Drei a firmware image to be loaded on site into the replaced equipment. Maintenance and the correction of errors are carried out according to the selected service level (refer to SLA).

2.4 Features.

The basic service EthernetP2P includes the following aspects:

- Provision of a fixed Ethernet connection between two customer locations with defined bandwidth
- Provision of a defined network interface at each of these customer-locations

- Provision of an optional router at each of these customer-locations (Special Design Topologies)
- Adherence to the respective service parameters in accordance with the booked service class

2.5 Interfaces.

Name	Interface elect./opt.	Interface mech.	Techn.	Bandwidth LAN Port	Bandwidth WAN Port	Spec.
Ethernet	10Base-T	RJ45	Copper	10 Mbps	2, 4, 6, 8, 10 Mbps	IEEE802.3u
Fast Ethernet	100Base-TX	RJ45	Copper	100 Mbps	20, 30, 40, 50, 100 Mbps	IEEE802.3u
	100Base-FX	LC/SC	LWL	100 Mbps	20, 30, 40, 50, 100 Mbps	IEEE802.3u
	100Base-SX	LC/SC	LWL	100 Mbps	20, 30, 40, 50, 100 Mbps	IEEE802.3u
Gigabit Ethernet	1000Base-T	RJ45	Copper	1000 Mbps	100, 200, 500, 1000 Mbps	IEEE802.3ab
	1000Base-LX SM 1310nm	LC/SC	LWL	1000 Mbps	100, 200, 500, 1000 Mbps	IEEE802.3z
	1000Base-SX MM 850nm	LC/SC	LWL	1000 Mbps	100, 200, 500, 1000 Mbps	IEEE802.3z
	1000Base-ZX SM 1550nm	LC/SC	LWL	1000 Mbps	100, 200, 500, 1000 Mbps	IEEE802.3z
	10GBase-SR MM 850nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae
	10GBase-LR SM 1310nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae
	10GBase-ER SM 1550nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae

	10GBase-SW MM 850nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae
	10GBase-LW SM 1310nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae
	10GBase-EW SM 1550nm	LC/SC	LWL	10 Gbps	2, 5, 10 Gbps	IEEE802.3ae

Remark: This table describes typical configurations. However, it is possible to select other interfaces, which has to be stated explicitly in the proposed solution. The standard EthernetP2P interface up to 100 Mbps is electrical, acceding 100 Mbps the standard interface is optical.

2.6 Connection bandwidths.

The following connection gross bandwidths are offered, including protocol overhead (frame header, etc.) which must be considered in the sizing process;

Connection Bandwidths	
2 Mbps	50 Mbps
4 Mbps	100 Mbps
6 Mbps	200 Mbps
8 Mbps	500 Mbps
10 Mbps	1 Gbps
20 Mbps	2 Gbps
30 Mbps	5 Gbps
40 Mbps	10 Gbps

2.7 Service classes.

Parameter	Default	Business2	Business1	VLL
CIR	10%	50%	90%	100%
Delay	<100ms	<50ms	<25ms	<25ms
Packet Loss	< 2%	< 1%	< 0,1%	< 0,1%
EVC Type	Multipoint			
Max. quantity of MAC addresses	8k /connection/domain			
max. Frame Size	1526			
VLAN Trunk	802.1q (transparent)			
CoS Tags	802.1q (transparent)			
Flow control	By agreement			
QinQ	By agreement			
VCRestore	By agreement			

Remark: Parameters included in the table above are guaranteed within the CIR bandwidth only.

3. Definitions.

Packet Loss: is indicated as a percentage of the CIR

Max. Frame Size: other values are possible by agreement

The VLL (Virtual Leased Line) class, referred to in the table, is dependent on whether it can be implemented in technical terms; thus implementation cannot be guaranteed at all customer locations.

The connection quality parameters stated above, particularly Delay can be guaranteed for connections within Austria only. Parameters for international connections are subject to specific arrangement.

3.1 Service level agreements.

For EthernetP2P, Service Level Agreements are offered on an optional basis. The exact features of the Service Level Agreements are stated in the document 'Service Level Agreement (SLA) – Carrier EthernetP2P'.

3.2 Customer enquiries and disturbance reports.

When the service is consigned, the customer obtains contact information (contact person, telephone number, e-mail etc.) for enquiries in the event of any disturbances to the service.

4. International EthernetP2P Service.

This paragraph is applicable if at least one endpoint of the EthernetP2P Service is located outside of Austria. There are two possible configurations, subject to specific terms and restrictions diverting from the EthernetP2P Service standard specification.

4.1 International EthernetP2P Service.

One end of the EthernetP2P Service terminates outside the network of Drei Austria. This still allows the Drei Austria Network Operations Center (NOC) to survey and manage the Service directly. Special terms and restrictions result from the technical or organizational capabilities of the regional Drei partners and will be stated within the specific offer.

4.2 International EthernetP2P Service Off-Net.

Both ends of the Drei EthernetP2P Service terminate outside the network of Drei Austria. The Drei Austria NOC will not be able to survey and manage the Service directly. Nevertheless, Drei remains the customer's single point of contact for any request concerning the EthernetP2P Service. Special terms and restrictions result from the technical or organizational capabilities of the regional Drei partners and will be stated within the specific offer. International EthernetP2P Off-Net Services are not suitable for Carrier backbone connections and will **not** be offered with service level agreement (SLA) Premium+.

4.3 Round Trip Delay Times for designated abroad regions.

Country/City - Vienna	RTD in ms
Serbia/Belgrade	25-35
Bosnia/Sarajevo	25-35
Macedonia/Skopje	36-30
Montenegro/Podgorica	30-34
Azerbaijan/Baku	95-100
Belarus/Minsk	
Georgia/Tbilisi	85-90
Kazakhstan/Astana	107-115
Kazakhstan/Almaty	112-120
Kyrgyzstan/Bishkek	115-123

Note: This table shows the technical standard parameters for Ethernet P2P product sets. It contains estimated typical RTD Times for data paths between Vienna (Austria) and certain foreign destinations.

5. Establishing the EthernetP2P Service.

Drei offers EthernetP2P connections on customer's request, so far as this is technically possible and economically justifiable. In this regard what must particularly be taken into consideration is the type of access technology (copper, optical fiber), as well as the opportunity to use existing infrastructure.

Remark: The EthernetP2P service is set up in coordination with the customer.

5.1 General preconditions in terms of construction.

For the set-up of a Drei EthernetP2P connection, it is a requirement that the customer location provides an installation space which is safe, clean, dry and sufficiently ventilated. The customer must ensure that an operating temperature range of +5°C to +40°C is maintained and that none of the equipment ever goes below thawing point. If air conditioning proves to be necessary, it is the responsibility of the customer to provide for it.

5.2 Access.

Access to the Drei facilities at customers' premises is regulated in General Terms & Conditions Wholesale.

5.3 Power Supply.

Access to the Drei facilities at customers' premises is regulated in General Terms & Conditions of Wholesale.

5.4 Network termination.

The Drei network termination equipment serves as a terminal for the EthernetP2P service. It fixes the boundary of responsibility between Drei and the customer. The network termination is set up in the form of a connection socket (e.g. device interface of the switch-on appliance). All network appliances on the Drei side, i.e. also the switch-on appliance itself, up to the network termination (i.e. on the network side), are in Drei's area of responsibility. Please notice that EthernetP2P in every topology is provided as a layer2 service. Especially with the special design topology including a half managed router, it is important to know that the logical network termination point is the same as with the standard topologies as described above. The half managed router provided by Drei falls outside the EthernetP2P network service.

5.5 Installation.

The EthernetP2P connection is made in accordance with the customary rules for installation (standard installation) in the surface-mounted version. The classification of the cable corresponds to the EN 50173 standard. Existing cabling may eventually be used after Drei has confirmed its suitability.

If it is the wish that, within the buildings, the cables for the subscriber's connection line are to be put into pipework or cable channels, or if this is necessary for other reasons outside of Drei's scope of responsibility (e.g. it is a precondition made by the authority entitled to require it) the corresponding pipework or cable channels are to be provided by the customer. If this service is provided by Drei, it is invoiced to the customer separately.

Any LAN (Local Area Network) cabling work is to be carried out by the customer. It remains the customer's responsibility if not explicitly stipulated otherwise.

5.6 Protective measures.

If the customer location is in an area at a higher risk from lightning, the protective measures and materials necessary to protect the Drei equipment are to be installed by an officially authorized electrical services company. The customer bears cost and risk.

5.7 Service handover.

After the installation is completed, the availability of the EthernetP2P service is checked in a service handover test, to ensure conformity to the quality requirements stated in the order. After the test is concluded positively, the handover of the services is completed by means of the service handover protocol.

5.8 Equipment.

The customer connects his/her items of equipment, using the corresponding connection cable, with the EthernetP2P network termination. Thus, access is established to the Drei Service. In this regard, the item

of equipment itself, including the connection cable, can either be under the scope of the customer's authority, and in the customer's area of responsibility, or be supplied as part of the solution from Drei.

The only items of equipment permitted to be connected to the EthernetP2P interface are those which display a valid CE approval marking and which conform to the indicated interface conditions (see Table paragraph 2.4). In any case of doubt, the approval of Drei has to be obtained.

6. Appendix.

6.1 Glossary.

CIR	The Committed Information Rate (CIR) is a defined share of the data-transfer bandwidth of an individual virtual connection, determined in the context of bit rate management. The CIR is a guaranteed (i.e. committed) static data rate which can be transferred through the network at any time. It is stated in bits-per-second (bps).
Delay	This value denotes the time required between the entry of an IP packet at the corresponding Customer-Edge (CE) router and the exit at any other CE router of the same customer or VPN respectively.
Packet Loss	This value gives the quantity of discarded IP packets which are measured between the entry point at the corresponding CE router and the exit at any other CE router of the same customer or VPN respectively.
EVC Type	The Ethernet Virtual Circuit type indicates which type of Ethernet connection is being set up.
Max. Number of MAC addresses	The quantity of hosts (MAC addresses) which are permitted to be contained in the Ethernet P2P service classes. In the VLL variant, Ethernet P2P operates transparently; a limitation of the number of hosts is not given here.
Max. Frame Size	Size of the data frame which can be transmitted; may be changed upon request.
VLAN Trunk	Permits the VLAN service to be used transparently, i.e. the customer has the possibility to tag VLANs of his/her own.
CoS Tags	These are the QoS classes defined in the Ethernet Standard, which give the customer the possibility to make a differentiation of the data stream.